

# Socioeconomic Status and Weight Control Practices among 20- to 45-Year-Old Women

## ABSTRACT

**Objectives.** This study examined the relationship between socioeconomic status (SES) and weight control practices in women.

**Methods.** SES, defined by family income, was examined in an economically diverse sample of 998 women in relation to dieting practices by means of multivariate regression analyses controlling for age, ethnicity, smoking, and body mass index.

**Results.** SES was positively associated with healthy, but not unhealthy, weight control practices; inversely related to energy and fat intake; and positively associated with weight concern and perceived social support for healthy eating and exercise. SES gradients were particularly striking at the low end of the income distribution (i.e., family income  $\leq$  \$10 000 per year). The SES gradient in body mass index persisted in analyses controlling for attitudes and behaviors.

**Conclusions.** Economic deprivation may contribute to high rates of obesity among lower SES women. The reasons for this require further research. (*Am J Public Health.* 1996; 86:1005-1010)

Robert W. Jeffery, PhD, and Simone A. French, PhD

## Introduction

The inverse association between socioeconomic status (SES) and obesity in US women is striking. There is a steep gradient between social class and both average body mass index and prevalence of obesity.<sup>1-5</sup> The gradient begins before adolescence<sup>6</sup> and is present across ethnic groups (e.g., Blacks and Hispanics).<sup>7,8</sup> Increases in weight with age are greater in lower SES women.<sup>9</sup> Recent upward secular trends in obesity prevalence also show an inverse SES gradient.<sup>10,11</sup>

Reasons for a strong social class gradient in obesity in women are not well understood. While the proximal cause must be differences in diet and exercise habits, the exact nature of and mechanisms responsible for behavioral differences by SES in women (but not men) need explication. Three general causal hypotheses have been articulated: discrimination, restricted environmental opportunity, and culture. According to the discrimination hypothesis, lower SES among obese women is driven by social forces that block socioeconomic advancement as a function of obesity. Evidence supporting this hypothesis includes data suggesting that obese women are less likely than nonobese women to marry,<sup>12</sup> that physical attractiveness predicts social advancement through marriage,<sup>13</sup> and that obesity negatively influences both employment<sup>14</sup> and educational opportunity.<sup>15</sup>

The access hypothesis for explaining social class differences in obesity argues that low SES imposes an economic liability on women that has negative behavioral consequences. Low SES reduces educational opportunities, resulting in lower levels of knowledge and behavioral skills needed to control weight. In addition, economic constraints restrict behavioral options (e.g., access to healthy foods, to

safe exercise, and to rewarding activities other than eating). Support for this hypothesis includes data showing lower nutrition knowledge<sup>16</sup> and higher perceived barriers to healthy eating and exercise in low SES women.<sup>17,18</sup>

The third explanation for social class differences in obesity is culture (i.e., lower SES women value weight control less). In some respects, the cultural argument is an extension of the economic one in that individuals with stressful life situations caused by economic deprivation have less time and effort to devote to personal health issues. It is also possible that there are cultural factors independent of economic necessity that contribute (e.g., cultural differences in standards of physical attractiveness). Evidence supporting this hypothesis includes data showing that lower SES women express less concern about their weight and devote less energy to weight control.<sup>19-23</sup>

The present paper examines SES differences in weight concerns and behaviors in a socioeconomically diverse sample of women participating in a study on weight gain prevention. Specific questions addressed are as follows: (1) How do health behaviors related to energy balance (diet, exercise, and smoking habits) differ among SES groups? (2) How do women in different SES groups differ in concern about body weight and weight

The authors are with the Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis.

Requests for reprints should be sent to Robert W. Jeffery, PhD, Division of Epidemiology, University of Minnesota, School of Public Health, 1300 S Second St, Suite 300, Minneapolis, MN 55454-1015.

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control practices? and (3) How do psychosocial characteristics that might influence body weight differ by SES?

## Methods

Data reported in this paper were derived from baseline surveys in the Pound of Prevention study, an intervention investigation being conducted in collaboration with four local health departments in the Minneapolis–St. Paul, Minn, metropolitan area. The aim of the study is to evaluate the effectiveness of low-cost interventions in reducing the rate of weight gain with age.

Study participants were recruited from heterogeneous sources over a period of 1 year. General recruiting through telephone solicitations in mixed SES neighborhoods, newspaper advertisements, and mailings to employees of a large educational institution (the University of Minnesota) yielded 229 men and 596 women. Recruitment by telephone in low SES neighborhoods, at shopping centers in those neighborhoods, and among participants in the Women, Infants, and Children supplemental food program yielded an additional 404 low-income women. Low-income women were paid \$20 for completing baseline assessments; other participants were not compensated.

Participants were screened for eligibility by phone or face-to-face interview and then attended a 1.5-hour assessment session at which self-report questionnaires were completed and height and weight were measured. Eligibility requirements were as follows: (1) age 20 to 45 years, (2) not pregnant or having given birth within 12 months, (3) not currently in treatment for a serious medical or psychological disorder, and (4) willingness to participate in the project over a period of 3 years. The present report is based on 998 women who provided data on family income, which was used as the basis for estimating SES.

## Measures

**Socioeconomic status.** Reported family income per year was used as the index of SES for the study. Income information was obtained from a question requesting total family unit income in \$5000 per year gradations to a maximum of \$40 000 or more per year. Five yearly income classes were defined: (1) less than \$10 000; (2) \$10 000 through \$19 000; (3) \$20 000 through \$29 999; (4) \$30 000 through \$39 999, and (5) \$40 000 or more.

**Other demographic information.** Education was defined as high school or less, vocational training, college education without a degree, college degree, and more than a college degree. Ethnicity was self-reported as White, Black, Native American, Asian, Hispanic, or other. Because of small numbers in each minority group, ethnicity was defined as White vs other for analysis purposes. Current employment and marital status were defined as dichotomous variables (yes or no).

**Weight and weight loss history.** Current height and weight were measured with a wall-mounted ruler and a calibrated balance beam scale. Participants also recalled their body weights at 15, 18, 20, 25, 30, 35, and 45 years of age and their maximum body weight, a methodology that previous research suggests is reliable and valid.<sup>24</sup> The following variables defined weight history: current body mass index (weight in kilograms divided by height in meters squared), maximum body mass index, body mass index at 18 years of age, and regressed slope of body mass index on age. History of weight loss was assessed by asking how often participants, intentionally and unintentionally, had previously lost 5–9 lb (2–4 kg), 10–19 lb (4–9 kg), 20–49 lb (9–22 kg), 50–79 lb (22–36 kg), 80–99 lb (36–45 kg), and 100 lb (45 kg) or more. Response categories were as follows: 0 times, 1 or 2 times, 3 or 4 times, 5 or 6 times, and 7 or more times. Variables derived were (1) total number of intentional and unintentional weight losses of 5 lb or more, (2) total amount of intentional and unintentional weight loss (defined as frequency multiplied by amount, derived by using the lower end of the frequency and amount intervals and summing across categories), and (3) whether participants had ever intentionally and unintentionally lost 20 lb or more.

**Health behaviors.** Current smoking was defined by a single questionnaire item. Total energy intake per day and percentage of energy from fat were estimated with the 60-item Block Food Frequency Questionnaire. This instrument has established reliability and is effective in rank ordering individuals, although it underestimates absolute nutrient intake.<sup>25,26</sup> Exercise behavior was assessed by means of an exercise frequency questionnaire developed by Jacobs et al.<sup>27</sup> The frequency of 13 different kinds of physical activity (of a duration of 20 minutes or more) over the previous year was assessed. For this analysis, the frequency of each activity was considered

individually, as was a total exercise score computed by multiplying activity frequency by intensity in metabolic equivalents (METs) and summing across items. This questionnaire has established reliability and predictive validity with respect to weight and weight change.<sup>28</sup> Dietary practices were also assessed with an 18-item questionnaire developed by Kristal et al.<sup>29</sup> that assesses behaviors contributing to fat intake (e.g., removing the skin from chicken).

**Weight concerns.** The Cognitive Restraint Subscale of the Three Factor Eating Questionnaire developed by Stunkard et al. was used to assess general dietary restraint. The questionnaire has established reliability and validity and is thought to be a measure of successful dieting.<sup>30</sup> The importance of weight among overall life concerns was assessed through a 15-item life domains scale. The importance of life domains such as self-esteem, financial security, weight, and personal safety was rated on a seven-point scale. Ratings were rank ordered for each subject, and the rank assigned to that individual's weight was used in analyses. This measure was developed specifically for this study, and thus reliability and validity are not known. Other measures of weight concern were desired body mass index, amount of weight participants would have to gain to take notice, and amount of weight they would have to gain before trying to lose weight.

**Social support for health behavior change.** Two questions measured perception of social support. Participants indicated, on a five-point scale, the degree of helpfulness of family and friends for making healthy eating and exercise changes. The validity of this measure has not been established.

**Weight control practices.** Participants were asked whether they had ever dieted to lose weight, had ever participated in a formal weight loss program, had regularly dieted in the last year, and were currently dieting to lose weight. Also, they were asked how often they weighed themselves, and they indicated whether they had used any of 23 specific weight control practices during the last year. Healthy practices included exercise, eating less fat, and increasing fruit and vegetable intake; unhealthy practices included fasting, skipping meals, using laxatives, and smoking. Each of the items was considered individually in this analysis. In addition, factor analysis identified a nine-item healthy dieting methods factor (i.e., reducing calories, increasing exercise, increasing

fruit and vegetable intake, decreasing fat intake, cutting out sweets and junk food, reducing amounts of food, changing type of food, eating less meat, and eating low-calorie diet foods; Cronbach's  $\alpha = .86$ ) and an unhealthy practices factor (i.e., use of laxatives, diuretics, appetite suppressants, diet pills, and liquid diet supplements; Cronbach's  $\alpha = .60$ ) that were also analyzed.

### Analysis

Dependent variables were grouped into five sets: (1) weight and weight change history, (2) diet and exercise behavior, (3) weight concern, (4) social support, and (5) weight loss practices. Initial examinations using multivariate analyses of variance yielded overall  $P$  values of less than .05 in each case, indicating that regression analyses of individual dependent variables were appropriate. All analyses reported included the entire study sample. However, identical analyses were also performed with White women only; these analyses yielded essentially the same results (data not shown).

The general linear models procedures of SAS<sup>31</sup> were used in conducting these regression analyses. Income group was used to predict each of the dependent variables described earlier; the continuous variables age and body mass index (not used in analyses of weight history) and the categorical variables smoking and ethnicity were used as covariates. Analyses of the social support measures also included marital status as a covariate.

The final step in the analysis was to examine the extent to which weight differences among women in different income groups could be accounted for by behaviors and attitudes. For this purpose, a series of regression analyses were performed that examined the ability of income category only and income category in combination with different sets of behavioral and attitudinal variables to predict body mass index.

## Results

### Measures

**Demographics.** Demographic characteristics are shown in Table 1 by income category (all differed significantly by income,  $P$ s < .05). Higher family income was associated with being older, better educated, married, employed, and White; it was also associated with nonsmoking status.

**TABLE 1—Baseline Characteristics of Sample of 20- to 45-Year-Old Women (n = 998), by Income Group**

	Income Group				
	<\$10 000	\$10 000–\$19 999	\$20 000–\$29 999	\$30 000–\$39 999	≥\$40 000
No.	129	162	218	145	344
Mean age, y	29.2	31.5	33.2	35.3	37.8
Education, %					
High school or less	44	17	12	8	6
Vocational school	14	20	13	12	7
Less than 4 years of college	34	31	32	30	22
College degree	6	24	35	34	40
More than college degree	2	7	7	17	26
Married, %	10	19	30	46	82
Ethnicity, %					
White	60	80	87	88	95
Black	25	15	7	6	2
Other	15	5	6	6	3
Employed, %	26	76	90	92	94
Current smoking, %	46	32	17	10	8

**TABLE 2—Weight and Weight Loss History of Sample, by Income Group**

	Income Group					<i>P</i>
	<\$10 000	\$10 000– \$19 999	\$20 000– \$29 999	\$30 000– \$39 999	≥\$40 000	
<b>Weight history, mean</b>						
Current BMI	30.0	27.7	27.1	26.0	25.7	.0001
BMI at age 18	22.9	22.0	21.9	21.5	21.3	.006
Maximum BMI	31.0	28.8	28.3	26.8	26.4	.0001
BMI slope (per year)	.60	.39	.30	.32	.32	.0001
<b>Weight loss history</b>						
No. intentional losses ≥ 5 lb, mean	5.4	5.4	5.6	5.1	5.2	.93
Total intentional losses, lb, mean	59.2	56.1	56.7	41.2	43.6	.16
No. unintentional losses ≥ 5 lb, mean	1.8	2.2	2.3	2.2	1.9	.22
Total unintentional losses, lb, mean	19.0	20.7	19.8	14.5	11.4	.08
Ever intentionally lost ≥ 20 lb, %	36	39	34	32	35	.76
Ever unintentionally lost ≥ 20 lb, %	19	9	10	9	5	.004

Note. Adjustments were made for age, smoking, and ethnicity. BMI = body mass index (weight in kilograms divided by height in meters squared).

**Weight history.** As expected, current body mass index, body mass index at 18 years of age, maximum body mass index, and rate of weight gain with age were inversely related to income (Table 2). History of intentional weight loss did not differ by income group. Reported history of unintentional weight loss, however, was somewhat greater in low-income groups.

Women in the lowest income category were nearly four times more likely than those in the highest income group to report having experienced an unintentional weight loss of greater than 20 lb.

**Diet and exercise.** Women in low-income groups reported higher total energy intake, a higher percentage of energy from fat, and fewer specific eating behav-

**TABLE 3—Diet and Physical Activity of Sample, by Income Group**

	Income Group					P
	<\$10 000	\$10 000– \$19 999	\$20 000– \$29 999	\$30 000– \$39 999	≥\$40 000	
Mean energy intake, calories per day	1915	1936	1609	1491	1493	.0004
Fat intake, %	37	35	34	33	33	.0003
Mean eating behavior score <sup>a</sup>	44.0	46.3	49.5	51.0	51.1	.0001
Mean physical activity score <sup>b</sup>	51.0	43.7	48.3	47.9	46.0	.36

Note. Adjustments were made for age, body mass index, smoking, and ethnicity.

<sup>a</sup>A mean score of 46.7 has been reported for 97 high-income women recruited from a health maintenance organization. See reference 29.

<sup>b</sup>Computed as the sum of the weekly frequency of 12 activities multiplied by the estimated intensity in metabolic equivalents for each activity. No normative values are available.

**TABLE 4—Weight Concern of Sample, by Income Group**

	Income Group					P
	<\$10 000	\$10 000– \$19 999	\$20 000– \$29 999	\$30 000– \$39 999	≥\$40 000	
Desired body mass index, kg/m <sup>2</sup> , mean	21.7	22.1	21.9	22.0	22.0	.35
Weight importance, mean rank	7.7	7.3	7.4	7.1	7.1	.65
Dietary restraint, mean Three Factor Eating Questionnaire score <sup>a</sup>	7.6	7.3	8.9	9.3	9.4	.0001
Mean amount of weight gained before noticing, lb	12.6	7.7	6.2	5.7	6.0	.0001
Mean amount of weight gained before acting, lb	19.5	13.7	12.0	9.7	10.7	.0007

Note. Adjustments were made for age, body mass index, smoking, and ethnicity.

<sup>a</sup>Mean values for participants in a weight loss program was 14.3 and for free eaters 6.0. See reference 30.

iors thought to promote a low-fat diet (Table 3). However, physical activity did not vary significantly by income group, as indicated by the total physical activity score or in analyses of individual physical activity items (data not shown). Individual item means suggested that higher income women were slightly more likely to engage in recreational physical activity, whereas lower income women reported more work-related and home maintenance-related physical activity. However, none of these differences were significant.

**Weight concerns.** Women in higher income groups reported that they would have to gain less weight before noticing it and less weight before taking action than those in lower income groups (Table 4).

Women in the lowest income group reported that they would have to gain 20 lb before they would do something about it, whereas those in the highest income group reported that a weight gain of 10 lb would trigger attempts at weight loss. Dietary restraint also increased monotonically with increasing income. There was no evidence, however, that women with different incomes differed in how much they would like to weigh or in the importance that they assigned to weight relative to other areas of their life.

**Social support.** Perception of support from family for healthy diet and exercise behaviors did not differ by income group ( $P = .20$ ). Perceived social support from friends, however, increased with increas-

ing income ( $P = .02$ ). Adjusted means for support from friends (on a 1 to 5 scale) were 2.5, 2.8, 2.8, 2.8, and 3.1 for the five income levels, respectively.

**Weight loss practices.** History of dieting, frequency of weighing, and healthful weight loss practices were positively related to reported income (Table 5). Unhealthy dieting practices, on the other hand, were only weakly related to income group. Although only one of the items (skipping meals) reached conventional levels of statistical significance, the trend suggests that such practices are more common in women with lower incomes (i.e., for eight of the nine unhealthy practices listed in Table 5, women with the lowest family income reported the highest adjusted prevalence).

### Multivariate Prediction of Body Mass Index

Multivariate analyses conducted to predict body mass index considered income alone, the addition individually of demographic covariates, diet and exercise, weight concerns, social support, weight loss practices, and, finally, all variables combined. Desired body mass index was not included in these analyses because it correlated .72 with body mass index and was thought to be an effect rather than a cause. In addition, only total healthy and unhealthy dieting scores were included in analyses of dietary practices. Income category alone explained 4% of the variance in body mass index ( $R^2 = .039$ ). The separate addition of demographic covariates, diet and exercise behaviors, weight concerns, social support, and weight loss practices to this base model increased the  $R^2$  values to .069, .085, .11, .041, and .20, respectively. Social support variables did not significantly improve the prediction of body mass index over and above income category alone. Each of the remaining sets, however, added a significant increment in  $R^2$  values (all  $P$ s < .01). A multivariate model that included all predictor variables had an  $R^2$  value of .30. Including all of these variables in the model, however, did not appreciably reduce the magnitude of the overall association between income group and body mass index. Body mass index remained monotonically inversely related to income, with an average difference between the lowest and highest income groups of about 3.6 body mass index units, or approximately 20 lb.

## Discussion

The present investigation examined differences among women of different income levels in behaviors and attitudes that may influence body weight. Although the generalizability of these findings to the population at large is limited in that study participants were volunteers recruited from sources of convenience and that the number of women in specific minority categories precluded separate analyses in these groups, the inclusion of large numbers of low- and high-income women provided a unique opportunity to examine SES differences across a wide range. Findings not previously reported include direct evidence that low-income women, in comparison with those at high income levels, (1) are both less attentive to their weight and more tolerant of weight gain, (2) perceive less social support from friends for healthy diet and exercise behavior, and (3) engage in fewer healthy, but not unhealthy, weight control practices. Behavioral differences between the most impoverished women (those with incomes below \$10 000 per year) and those with higher family incomes were particularly striking. The SES gradients for weight, rate of weight gain with age, prevalence of unhealthy dieting practices, and attention to and tolerance for weight gain were particularly noticeable at this end of the income distribution. These findings suggest that careful study of women at very low SES levels might be particularly revealing in terms of the causes of social class differences in obesity.

Previous studies of SES differences in diet and exercise in women have produced mixed results.<sup>32-41</sup> The present data suggest that differences in diet are the most likely proximal cause of SES differences in obesity. Both total intake and percentage of energy intake from fat were much higher at the lower end of the SES distribution, whereas exercise differences between income groups were minimal. It should be kept in mind in interpreting these findings, however, that the analyses controlled for body mass index. The purpose of controlling for body mass index was to search for factors intrinsic to social class that might contribute to obesity, independent of obesity itself. Apparently, there are strong SES-related differences in diet, independent of weight, that could plausibly contribute to obesity in women. While exercise has been shown to be correlated with obesity<sup>28</sup> and with social class,<sup>41</sup> it was not corre-

**TABLE 5—Weight Loss Practices in Sample, by Income Group**

	Income Group					P
	<\$10 000	\$10 000–\$19 999	\$20 000–\$29 999	\$30 000–\$39 999	≥\$40 000	
Dieting history and general practices						
Ever dieted, %	65	81	81	84	87	.0001
Ever participated in formal program, %	16	29	37	38	44	.0001
Regular dieting in last year, %	14	13	17	17	24	.08
Currently dieting, %	16	17	26	23	25	.15
Frequency of weighing, no. of times per month	3.3	4.4	4.5	5.9	5.7	.18
Healthy dieting practices in the last year, %						
Reduced calories	32	35	45	53	56	.0001
Increased exercise	36	40	49	48	53	.04
Increased fruits and vegetables	24	22	23	37	32	.008
Reduced snacks	32	26	35	37	42	.03
Decreased fat	32	37	47	46	56	.0005
Reduced sweets and junk food	33	36	37	46	49	.02
Reduced food amount	48	36	49	50	54	.009
Changed type of food	26	31	35	39	41	.09
Consumed less meat	13	12	15	14	20	.19
Consumed fewer carbohydrates	8	7	7	11	8	.69
Consumed less alcohol	6	6	7	10	9	.55
Ate diet foods	13	14	24	20	32	.0001
Visited diet center offering food	0	1	1	4	5	.05
Visited diet center not offering food	5	5	9	10	14	.02
Unhealthy dieting practices in the last year, %						
Fasted	9	3	7	5	4	.20
Skipped meals	26	14	14	15	12	.03
Smoked more	4	1	2	1	1	.18
Used laxatives	2	1	1	1	1	.94
Used diuretics	3	2	2	0	2	.45
Used appetite suppressants	8	4	5	6	7	.53
Used diet pills	8	5	3	4	2	.13
Vomited	3	1	0	0	0	.10
Consumed liquid diet	8	6	7	6	8	.93
Composite factor scores						
Healthy dieting practices	2.6	2.6	3.2	3.5	3.9	.0001
Unhealthy dieting practices	0.3	0.2	0.2	0.2	0.2	.51

Note. Adjustments were made for age, body mass index, smoking, and ethnicity.

lated with social class independent of obesity in this study.

A somewhat surprising finding in these data was that, although weight concerns were higher and current dieting practices more prevalent in high than in low income groups, there were no differences in reported history of intentional weight loss. One possible explanation is that much of the dieting that occurs in higher income women is successful in

preventing weight gain but not in producing weight loss. Another might be that retrospective reports of intentional weight loss differ in validity by SES. Further investigation of these issues is warranted.

Three general causal hypotheses for the SES gradient in obesity were presented at the outset of this paper. Although cross-sectional data are a poor basis for drawing causal inferences and the present data set contains less informa-

tion than desired on some key concepts involved, our findings provide interesting points for discussion. The steep gradients at the very low end of the income distribution in body mass index and both healthy and unhealthy dietary practices are noteworthy and suggest that the role of economic resources in determining weight control activities deserves closer scrutiny. The observation that desired weight and the perceived importance of weight did not differ by income group, even though dieting behaviors, attention to weight, and perceived social support did, casts some doubt on the hypothesis that low SES women care less about their weight. Finally, low rates of marriage and employment in lower income women are consistent with the hypothesis that discrimination hampers the social advancement of obese individuals, although additional data, preferably longitudinal, are needed to explore this further.

Finally, the fact that including all available variables in a multivariate model to predict body mass index in this population failed to substantially reduce the association between body mass index and income deserves comment. One possible reason is simply that tools for measuring behaviors (i.e., diet, exercise, and weight control practices) are not precise enough for successful individual-level prediction of body mass index. Alternatively, there may be other unmeasured variables, such as cultural values or social and economic barriers, that need further exploration. □

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